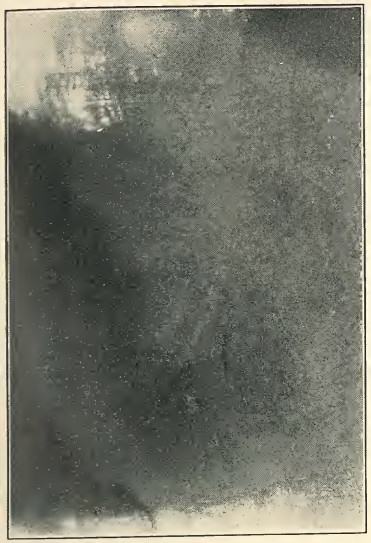
Nos. 1 and 2 show penetration of a ten-minute exposure with an air-cooled lamp through a body weighing 110 pounds.

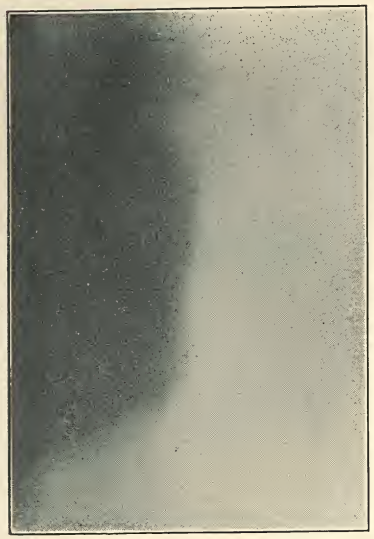
No. 3 shows penetration of a ten-minute exposure with an air-cooled lamp through the abdomen of a man weighing 160 pounds.

No. 4 shows penetration of a half-minute exposure with a water-cooled lamp through a hand.



No. 1 (Chest)

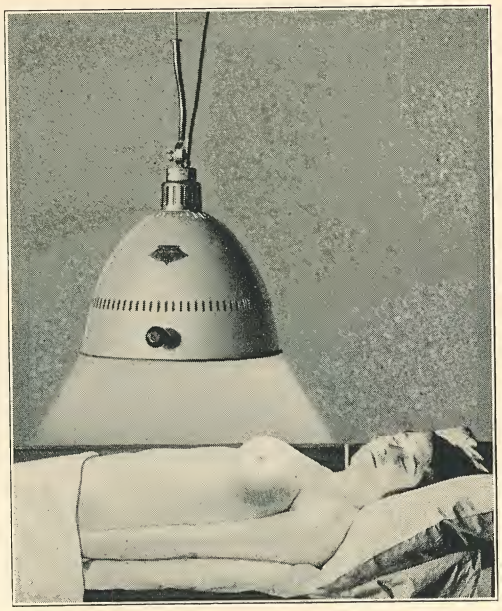
No. 2 (Abdomen)



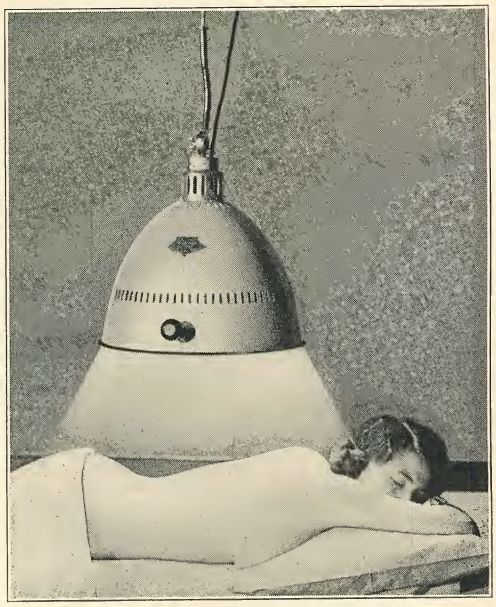
No. 3 (Abdomen)

No. 4 (Hand)

Plate I

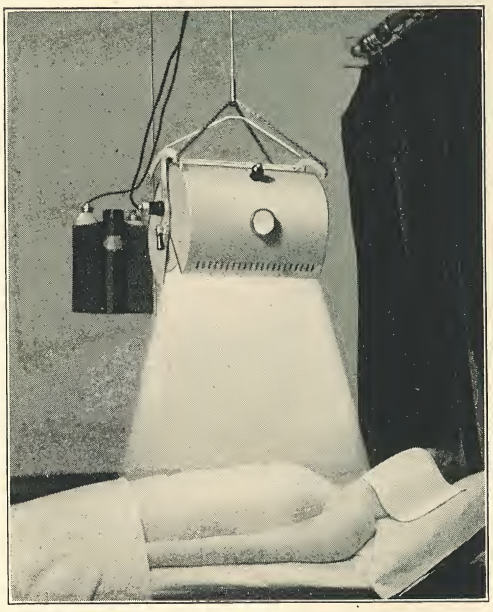


First position of patient for general treatment with radiant light. Note position.

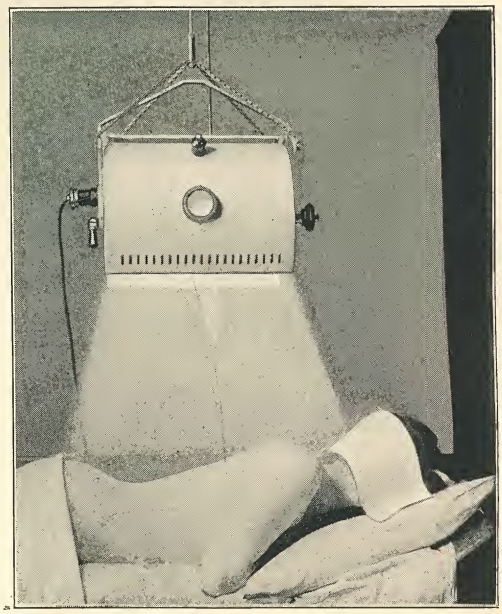


Second position of patient for general treatment with radiant light. Note distance.

Plate II



Third position. Patient receiving first part of general treatment with actinic rays.



Fourth position. Patient receiving second part of general treatment with actinic rays. Note facial covering.

Plate III

plays a part in their formation. Using these known facts, Burge continued his experiments using these substances in solution and found that the lens protein modified by them *could be* coagulated by actinic radiation and opacity of the lens produced. It appears from the experiments that these same substances decreased the fluorescence of the lens, which suggests the thought that there may be some relation between the fluorescent property of the lens and its ability to resist the actinic radiations.

Experiments were then made with actinic rays on non-fluorescing and fluorescing bacteria, and it was found that, of seven different kinds of the first variety, none were alive after an exposure of two hundred seconds, while none of the cultures of the latter form of bacteria were completely destroyed after a similar length of time. Burge advances the provisional hypothesis that the great resistance exhibited by the lens and by fluorescing bacteria to the action of the actinic rays is due to this power of fluorescence, and he assumes that the lens and fluorescing bacteria convert the absorbed short waves into longer waves, thus diminishing more or less the energy which otherwise would have been spent in coagulating their protein.

In treating chronic cases one must not look for immediate results, but rather a gradual improvement from week to week, while in acute cases one may reasonably expect improvement within a few hours. We sometimes get results in minutes.

Experience has taught us that much greater benefit can be obtained if the capillaries are first dilated with a two- or three-thousand-candlepower radiant light, bringing the blood to the surface where it can be acted upon by the actinic rays, lymph and blood stasis being relieved by the same method and at the same time.

DEEP PENETRATION

Recognizing the fact that the blood stream absorbs *most* of the actinic rays, it stands to reason that if deep penetration of tissues with large quantities of rays is desired, all circulating

Local treatment under compression.

Plate IV

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Oct. 27	4 min.	½ in.	
Oct. 30	5 min.	½ in.	Shows improvement.
Nov. 6	6 min.	½ in.	
Nov. 9	4 min.	½ in.	Much improved.
Nov. 15	3 min.	½ in.	
Nov. 22	4 min.	½ in.	
Nov. 30	5 min.	½ in.	
Dec. 6	6 min.	½ in.	Nearly smooth.
Dec. 10	5 min.	½ in.	
Dec. 20	5 min.	½ in.	
1918			
Jan. 31	5 min.	½ in.	Smooth.
Mar. 22	4 min.	½ in.	Smooth.
May 17	6 min.	½ in.	Smooth.
Oct. 30	4 min.	½ in.	Skin smooth and appears normal.
Dec. 6	2 min.	½ in.	Apparently well.

Nasal

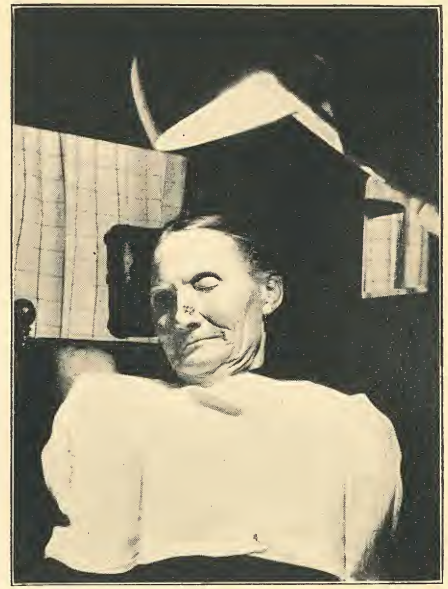
Case No. 392. Female. Age, 56. Referred by Dr. L. L. Wescott, Chicago. Papule started on right side of nose two years ago. Was healed one year ago, but soon reappeared. Itches at times. Has been scabbed over for several months.

Treatments as follows:

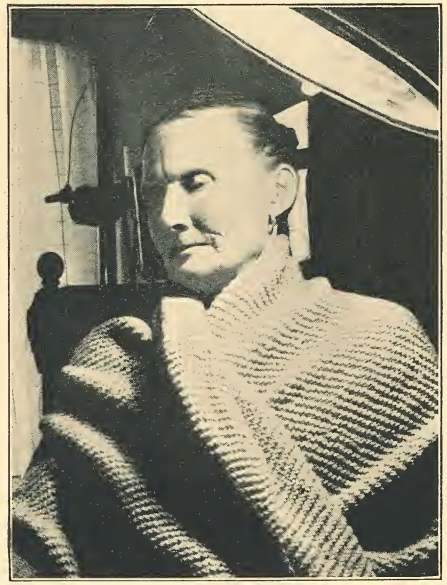
DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1918	Duration of Treatment	Distance from Patient	
Jan. 26	6 min.	½ in.	
Feb. 2	5 min.	½ in.	Improved.
Feb. 11	6 min.	½ in.	Much improved.
Feb. 23	5 min.	½ in.	Skin smooth.
Mar. 23	4 min.	½ in.	Skin smooth.

Diagnosis: Epithelioma.

Two pictures of Case No. 179—Epithelioma



Before treatment.



After treatment.

Plate V

Arrows indicate area of extra-gastric pressure. (See Roentgen findings, page 69.)

Plate VI

The same stomach is here pictured as in Plate VI and shows a decrease or absence of extra-gastric pressure.

Plate VII

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	Distance from Patient	
June 4	.....	3 min.	20 in.	Cachectic.
June 5	.....	4 min.	18 in.	
June 6	.....	9 min.	16 in.	
June 7	.....	10 min.	14 in.	Mucus in stools.
June 12	.....	13 min.	12 in.	
June 13	.....	20 min.	12 in.	
July 3	.....	15 min.	10 in.	No mucus. Feels better.
July 5	.....	15 min.	10 in.	Less cachexia.
July 7	.....	17 min.	10 in.	Sleep improved.
July 12	.....	20 min.	10 in.	Pain in epigastrium.
July 19	.....	20 min.	10 in.	
July 20	10 min.	15 min.	10 in.	No pain.
July 23	10 min.	15 min.	10 in.	Bowels improved.
Aug. 1	10 min.	10 min.	10 in.	
Aug. 4	10 min.	12 min.	10 in.	Feels better in every way.
Aug. 6	10 min.	8 min.	10 in.	Feels better in every way.
Aug. 10	10 min.	10 min.	10 in.	
Aug. 13	10 min.	10 min.	10 in.	Actinic-ray treatments at home until December 8th, when he was referred to Dr. Roemer, Waukegan, Ill., for traction.
1918				
May 16	.....	.....	.....	Reports a gain of 10 pounds (145).
Oct. 15	.....	.....	.....	Working every day.

His regular weight for years was about 180 pounds. At the time he came to us it was 153 pounds; later it rose to 163 and fell to 143; and on October 15, 1918, it was 151 pounds. (See plates VI and VII.)

Roentgen findings as follows:

Roentgenograms of Case No. 247

(Page 67)

A specimen was then sent to Dr. Herzog, who made the first diagnosis of round-celled sarcoma, and after examining the second specimen he still insisted his first decision was correct; i. e., round-celled sarcoma.

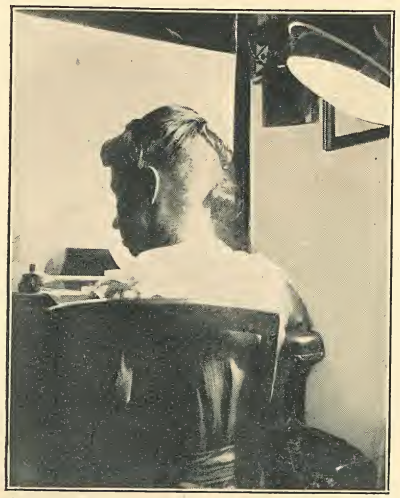
Following cauterization there was no pain, and the patient left the hospital in forty-eight hours. Treatments were resumed:

DATE 1917	RADIANT LIGHT Duration of Treatment	ACTINIC RAYS Duration of Treatment: Air-cooled Lamp	Water-cooled Lamp	Distance from Patient: Air-cooled Lamp	Water-cooled Lamp	CLINICAL FINDINGS
Dec. 9	7 min.	15 min.	15 min.	12 in.	Contact	
Dec. 12	7 min.	15 min.	15 min.	12 in.	Contact	Pack removed. Slight bleeding.
Dec.	7 min.	15 min.	15 min.	12 in.	Contact	Best night she has had up to this time.
Dec. 18	7 min.	15 min.	15 min.	12 in.	Contact	
Dec. 24	7 min.	15 min.	15 min.	12 in.	Contact	
Dec. 29	7 min.	15 min.	15 min.	12 in.	Contact	

January 4th bleeding which proved to be a spurting artery started from the center of the cauterized area. She was awakened by the warm blood soaking her night-clothes. The flow was easily controlled by pressure, which was maintained for over one hour while waiting for the ambulance to take her to Augustana Hospital for cauterization. The bleeding was readily controlled with the cautery; no anesthetic was used. Twelve hours later she was in good condition; left the hospital and took her treatments as usual.

DATE 1918	RADIANT LIGHT Duration of Treatment	ACTINIC RAYS Duration of Treatment: Air-cooled Lamp	Water-cooled Lamp	Distance from Patient: Air-cooled Lamp	Water-cooled Lamp	CLINICAL FINDINGS
Jan. 5	7 min.	15 min.	15 min.	12 in.	Contact	
Jan. 14	8 min.	15 min.	15 min.	12 in.	Contact	Cauterized places filling in nicely.
Jan. 21	6 min.	12 min.	15 min.	12 in.	Contact	A new spot discovered about one inch to right of cauterized area.
Jan. 31	5 min.	10 min.	35 min.	12 in.	Contact	
Feb. 5	5 min.	10 min.	40 min.	12 in.	Contact	
Feb. 8	5 min.	10 min.	50 min.	12 in.	Contact	

Four pictures of Case No. 345—Sarcoma



Appearance when patient came to us.

The "x" shows the exposed brain tissue, above which is the cauterized area.

Showing position of water-cooled lamp when treating granulating wounds. Wound nearly healed.

The "x" shows same area as in picture above. Wound healed.

Plate VIII

Fibrosarcoma (Spinal)

Case No. 489. Female. Age, 16. Referred by Dr. Oscar Jones, Indianapolis, Ind. In August, 1917, she noticed a small lump near the spinous process of the eighth dorsal vertebra, left side. It did not trouble her; so she gave it no attention until November, 1917, when it began to pain and she consulted a doctor, who applied ointments until May, 1918, at which time she changed doctors and was told that it must be operated at once.

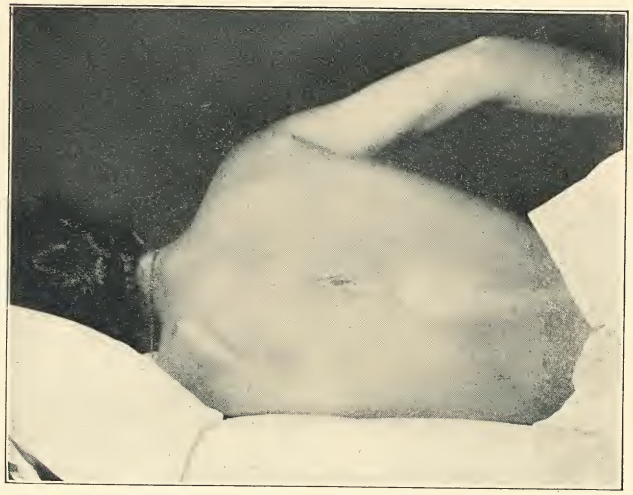
The operation was performed on May 14, 1918, by Dr. T. B. Noble, Indianapolis, Ind., who, after a microscopic examination of the excised tissue, pronounced it an osteosarcoma. She was in the hospital for six weeks, but the wound did not heal. She was told that it was a sarcoma and that nothing could be done for her. When referred to us, the mass was about 5 x 10 cm. in size, running from the sixth to the tenth dorsal vertebra, left side. Running across the top of the mass was an unhealed wound from which was coming a pus discharge.

She came to us July 11th, and we immediately sent her to the Michigan Boulevard Building X-Ray Laboratory for a stereoscopic picture, which macroscopically did not show bone involvement. We therefore sent her to Hahnemann Hospital, Chicago, where, on the 12th, we removed the mass with a Percy Cautery. In order to remove the growth it was necessary to remove the erector-spinæ muscles, exposing the spinous and transverse processes of the vertebra. The excision was carried outward to the angle of the ribs.

When she awoke from the anesthetic, the pain which she had had for months had disappeared. On the 13th her temperature was 102°; pulse 150; and there was no pain. She was in splendid condition, having passed a good night. On the 14th her temperature was 101.4°; pulse 130; no pain. On the 15th her temperature was 100°; pulse 96; complained of being hungry. On the 16th temperature was 99°; pulse 100; she was able to sit up in bed. On the 17th her temperature was 98.6°; pulse 80; and she was without ache or pain.

Two pictures of Case No. 489—Fibrosarcoma

Showing wound one week after operation.



Showing scar as it appeared eighty-one days after operation.

Plate IX

Case No. 314. Female. Age, 36. Has had hay fever for eight consecutive years. As she lives out of the city, she took her actinic-ray treatments two weeks previous to the expected attack. We used the water-cooled lamp with the solid-quartz applicator, treating the interior of the nose as follows:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Aug. 4	5 min.	Contact	
Aug. 5	4 min.	Contact	
Aug. 6	4 min.	Contact	Breathing more freely.
Aug. 7	5 min.	Contact	Breathing more freely.
Aug. 8	6 min.	Contact	
Aug. 9	7 min.	Contact	
Aug. 10	6 min.	Contact	
Aug. 29	.....	.....	Reported she was having the least hay fever she had had in years.

Case No. 484. Female. Age, 42. Hay fever in September, 1917. Sneezing constantly with lachrymation for several days past. Actinic-ray treatments with water-cooled lamp to interior of nose with solid-quartz applicator used in contact with the turbinates.

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1918	Duration of Treatment	Distance from Patient	
July 8	3 min.	Contact	
July 10	3 min.	Contact	Improved.
July 11	3 min.	Contact	Sneezed once during twenty-four hours.
July 12	3 min.	Contact	Sneezed once during twenty-four hours.
July 17	3 min.	Contact	Much improved.
July 21	3 min.	Contact	No sneezing.

Solid-Quartz Applicators

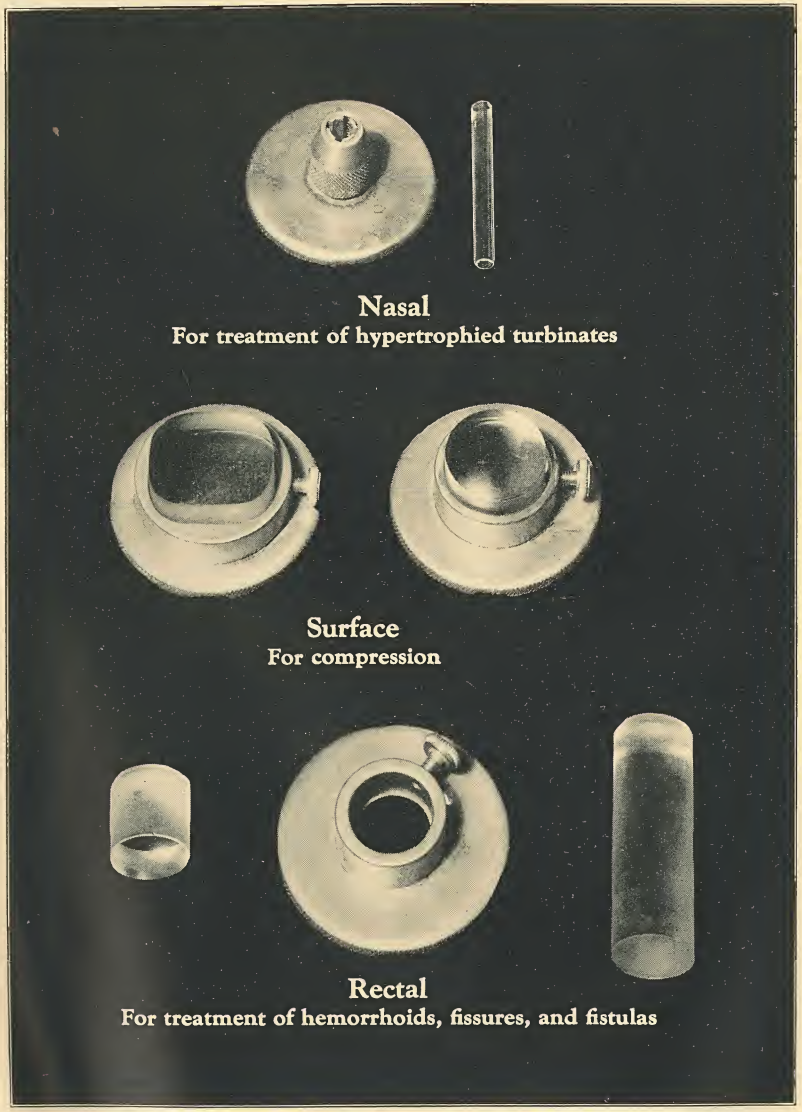
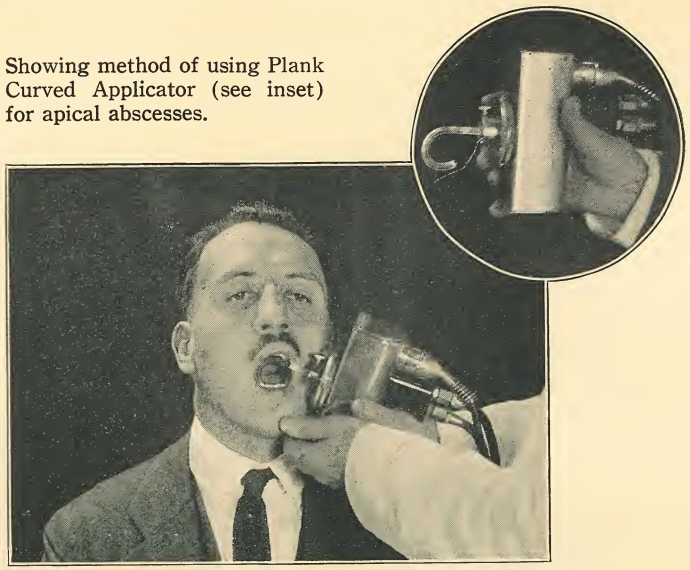


Plate X



Showing method of using Plank Curved Applicator (see inset) for apical abscesses.

Showing method of treating larynx with Plank Curved Applicator (see inset).

Plate XI

HEMORRHOIDS

Case No. 510. Male. Age, 45. Hemorrhoids for twenty-five years. Operated ten years ago without relief. Began treatment with galvanism in October, 1918. Contraction of tumors started after first four treatments, but pain was still severe. On November 17, 1918, gave a two-minute actinic-ray treatment with the water-cooled lamp, using a special quartz applicator and compression, which relieved the pain very markedly. On November 20th gave a three-minute treatment; a four-minute one on the 24th; and on the 27th a five-minute treatment, after which there was no pain and very little protrusion. December 4th gave a six-minute treatment, and on the 15th a second six-minute treatment, which blistered quite badly but gave almost complete relief from the hemorrhoids.

HEPATITIS

Case No. 74B. Male. Age, 16. Had been getting more and more jaundiced for the past week and for several days had felt tired all the time. Pulse, 50; temperature, 98°. Liver enlarged.

He was given the following actinic-ray treatments:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Air-cooled Lamp		
1916	Duration of Treatment	Distance from Patient	
Oct. 22	4 min.	24 in.	
Oct. 23	5 min.	20 in.	Blistered.
Oct. 24	4 min.	20 in.	
Oct. 26	6 min.	20 in.	Much improved.
Oct. 28	6 min.	20 in.	Less jaundiced.
Oct. 30	7 min.	18 in.	Still slightly jaundiced but feeling fine.

Several subsequent reports showed continued improvement and no return of the trouble.

PRURITIS

Ani

Case No. 351. Female. Age, 59. Referred by Dr. M. B. Blouke, Chicago. Came to us October 24, 1917, itching about anus, which began in May, 1917, and had grown steadily worse until it was almost unbearable. There was some vaginal leucorrhea.

Actinic-ray treatments as follows—vaginal treatment through speculum:

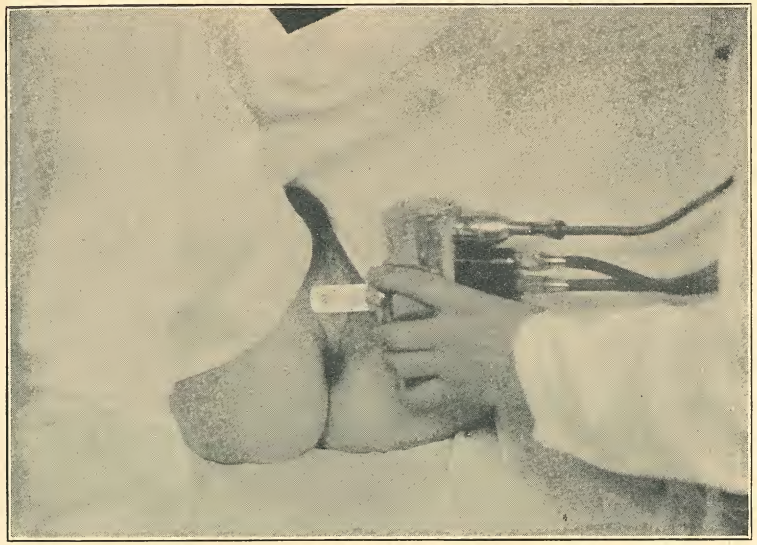
DATE	ACTINIC RAYS			CLINICAL FINDINGS
	Duration of Treatment		Distance from Patient	
1917	Water-cooled Lamp			
	Skin	Vagina		
Oct. 24	2 min.	.....	2 in.	
Oct. 27	2 min.	6 min.	2 in.	Relief.
Oct. 30	2 min.	7 min.	2 in.	Less discharge.
Nov. 1	2 min.	9 min.	2 in.	Less discharge.
Nov. 5	2 min.	9 min.	2 in.	Less discharge.
Nov. 7	3 min.	9 min.	2 in.	Less discharge.
Nov. 9	3 min.	.....	2 in.	No discharge.
Nov. 26	3 min.	.....	2 in.	Very little itching. Dismissed.

Vulvæ

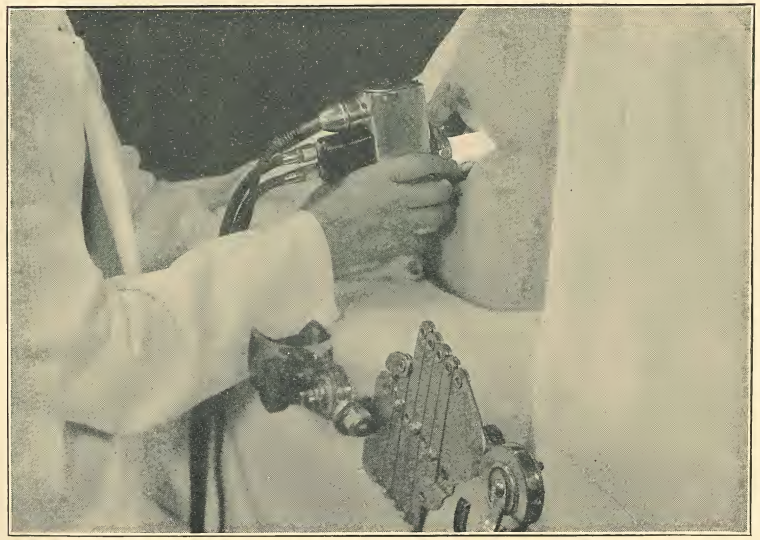
Case No. 299. Female. Age, 35. Referred by Dr. B. A. McBurney, Pamona, Cal. Had a pruritis vulvæ of two years' standing which had grown rapidly worse during the past six months; slight abrasions of skin over pubes and labium majus from scratching.

A one-and-one-half-minute treatment gave complete relief for one night; a second treatment of two minutes gave some relief; while the third treatment of four minutes, though it blistered badly, gave almost complete relief from the itching. The water-cooled lamp was used in this case. Slight itching has returned at times, but a mild non-blistering raying readily controlled it. No other treatment internally or externally was used.

Actinic-ray treatments:



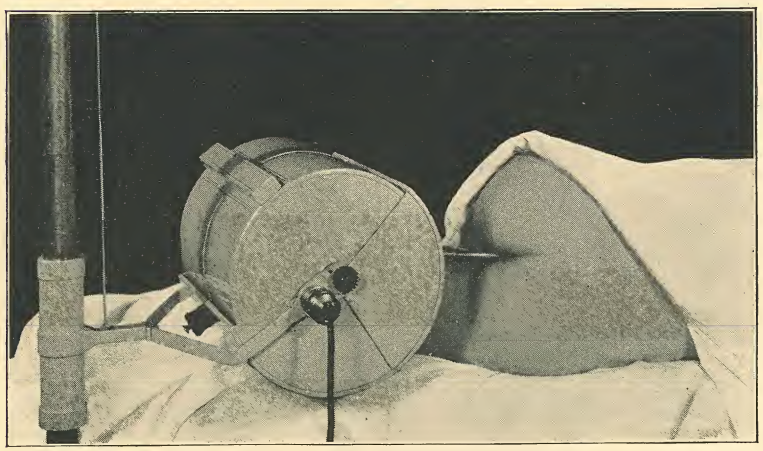
Treatment for Bartholin abscess.



Local treatment for external hemorrhoids.

Plate XIII

Prostatic treatment with water-cooled lamp.



Prostatic treatment with air-cooled lamp.

Plate XIV

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Aug. 18	1½ min.	4 in.	
Aug. 20	2 min.	2 in.	Less itching.
Aug. 23	4 min.	3 in.	
Oct. 5	2 min.	4 in.	Badly blistered.
Oct. 17	2 min.	4 in.	Much improvement.
Oct. 24	4 min.	4 in.	
Nov. 9	5 min.	4 in.	
Nov. 20	4 min.	4 in.	Slight itching.

PROSTATITIS

Chronic

Case No. 0100. Male. Age, 57. His bladder control had grown so bad that when Nature called he would lose a part of its contents before he could get into the adjoining room. He was up every hour of the night.

Actinic rays were begun in October, 1917, and continued, as follows:

DATE	ACTINIC RAYS	PROSTATE MASSAGE	CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	
Oct. 12	10 min.	4 min.	Slight control.
Oct. 13	6 min.	2 min.	
Oct. 19	10 min.	2 min.	
Oct. 24	10 min.	3 min.	Better control.
Oct. 26	10 min.	3 min.	
Oct. 30	10 min.	3 min.	
Nov. 5	10 min.	3 min.	
Nov. 9	10 min.	3 min.	
Nov. 15	10 min.	3 min.	Control for two hours.
Nov. 28	10 min.	3 min.	Improved. Three times at night.
Dec. 10	10 min.	3 min.	Bladder held eight ounces.
Dec. 21	10 min.	3 min.	Can go for four hours. Bladder held ten ounces.
1918			
Jan. 8	10 min.	3 min.	Bladder control nearly normal.

PYOSALPINX

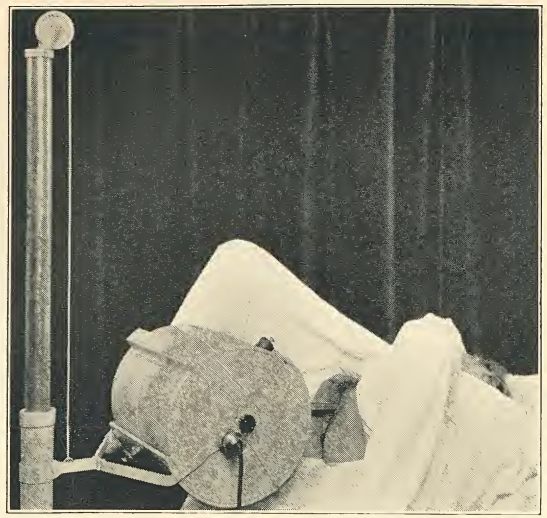
Case No. 191. Female. Age, 26. Came to us February 15, 1917, with a history of exposure December, 1916, and burning on urinating ever since. She now had pain in both ovarian regions, with a sense of weight throughout the pelvis. We gave her the following treatments:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Feb. 15	10 min.	2 in.	Considerable pain.
Feb. 16	12 min.	2 in.	Discharge yellow.
Feb. 22	12 min.	2 in.	Has been flowing; less pain.
Feb. 28	10 min.	2 in.	No pain.
Mar. 2	10 min.	2 in.	
Mar. 9	10 min.	2 in.	Discharge white.
Mar. 14	10 min.	2 in.	No pain; slight discharge.
Mar. 17	12 min.	2 in.	No pain or soreness.
Mar. 28	12 min.	2 in.	Very much improved.

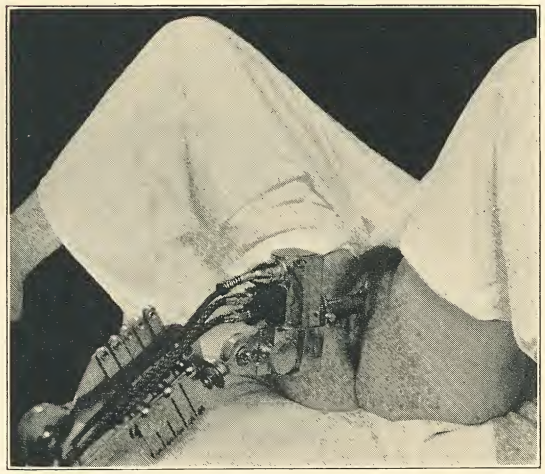
PYONEPHROSIS

Case No. 221. Female. Age 45. Referred by Dr. ....., Chicago. One year ago she had had rheumatism and endocarditis, following which she developed pyonephrosis. The bacilli found in the urine were mostly colonic, with some streptococci and staphylococci. Her temperature ranged from 99° to 101° until September 1, 1916. Since that time she had had weekly injections of antiseptics into the kidney through a ureteral catheter and had improved slightly. She still had considerable pus and many bacteria in the urine when she came to us April 21, 1917, feeling, as she described it, "All in," and unable to follow her usual vocation.

We gave her the following actinic-ray treatments:



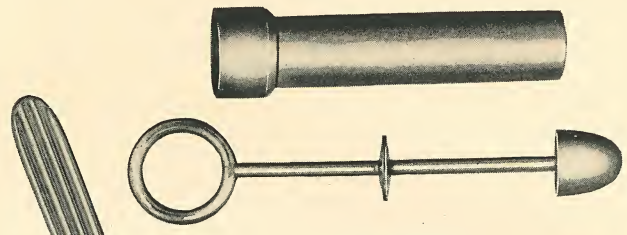
Pelvic treatment with air-cooled lamp.



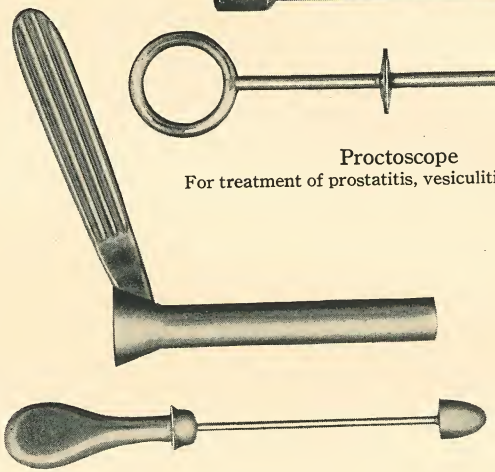
Pelvic treatment with water-cooled lamp.

Plate XV

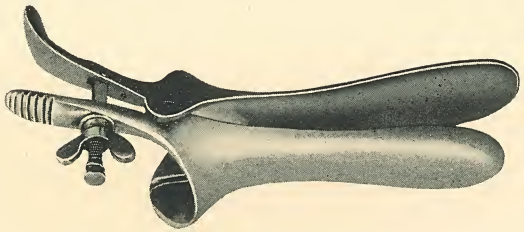
Specula



Proctoscope
For treatment of prostatitis, vesiculitis, and cystitis



Cystoscope
For treatment of urethritis



Fitch's vaginal speculum
For treatment of vaginitis, cystitis, and urethritis

Plate XVI

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Air-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
April 21	2 min.	20 in.	
April 22	4 min.	16 in.	
April 23	4 min.	14 in.	Less tired.
April 26	9 min.	12 in.	Feeling fine and works without tiring.
April 28	12 min.	12 in.	Steadily improving.
May 2	15 min.	12 in.	Urine cloudy.
May 16	15 min.	12 in.	Caught cold.
May 25	15 min.	12 in.	Feeling fine. Going to country for vacation.

This case was not seen again until May 6, 1918, when she reported that she had had a good year, and had been able to continue her work uninterruptedly.

RHINITIS

Atrophic

Case No. 21. Male. Age, 28. Crusts had been forming daily in nostril for past three years. Tonsils hypertrophied and contained caseous masses.

Treatments:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Jan. 10	2 min.	½ in.	
Jan. 11	2 min.	½ in.	Breathes more freely.
Jan. 13	2 min.	½ in.	Less crusts.
Jan. 15	2 min.	½ in.	
Jan. 17	2 min.	½ in.	Bloody discharge from nose.
Jan. 20	.....	.....	Removed tonsils complete.
Jan. 26	.....	.....	Throat in good condition.
Feb. 6	2 min.	½ in.	Breathing freely.
Feb. 9	3 min.	½ in.	Breathing freely.
Feb. 12	5 min.	½ in.	Breathing freely.
Mar. 3	4 min.	½ in.	Breathing freely.
Mar. 17	4 min.	½ in.	Dismissed.

November 26, 1918, the blood count was:

Erythrocytes	4,462,000
Leucocytes	160,000
Hemoglobin	75%
Myelocytes	18%

SYCOSIS

Case No. 39D. Female. Age, 10. Sycotic patch on occipital portion of scalp about 6 cm. in diameter. First actinic-ray treatment with the water-cooled lamp, at a distance of one inch, for three minutes, was sufficient to destroy the infection.

SYPHILIS

Case No. 273. Male. Age, 37. Came to us July 22, 1917. Ten weeks previous he had noticed a sore on the side of the glans penis. He had a Wasserman examination made at the Presbyterian Hospital, New Orleans, on June 2, 1917. On June 23d the sore had refused to heal; so he had scrapings taken for dark-field examination and another Wasserman made at the same hospital. All reports were negative.

At the time he came to us the sore was of the size of a silver dime, the edges and surface soft, and it had the appearance of chancroid. We gave him three actinic-ray treatments with the water-cooled lamp, which did not start the healing process. We then started giving him sodium cacodylate, and within three days the sore had commenced to heal, proving the diagnosis. On August 11th the sore was entirely healed and his general health greatly improved.

TINEA

Barbæ

Case No. 46. Male. Age, 20. Trichophytinea barbæ of four weeks' duration. Right side of face from lower maxilla to clavicle and beyond median line, both anteriorly and posteriorly,

Applicators

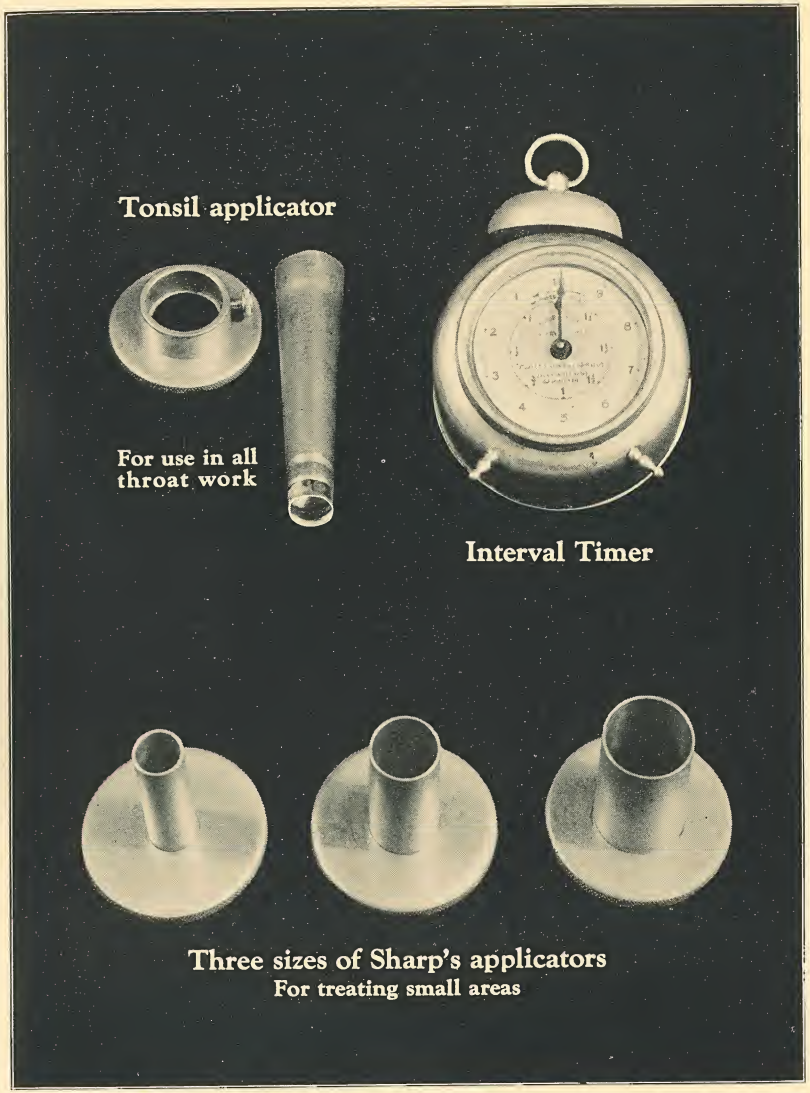


Plate XVII

Local treatment of tonsils.

Plate XVIII

was a mass of scabs and abscesses. Of the latter we opened six. April 26, 1916, we gave a nine-minute treatment with the air-cooled lamp; April 27th, a ten-minute treatment, when we removed the scabs. It had been spreading a half-inch a day before he came to us. The first treatment stopped the spreading, and at the end of the first twenty-four hours the edges were retracting. April 20th we gave a twelve-minute treatment, and on the 29th one of eighteen minutes. Following this he had six treatments, when he was discharged. No other treatment was used. We saw him in January, 1917, and he had remained well.

Tonsorans

Case No. 39D. Female. Age, 18. Came to us September 4, 1916, with a well-developed case of tinea tonsorans. She was given a three-minute treatment with actinic rays from a water-cooled lamp, at a distance of one inch, which destroyed all evidence of infection. We have seen her frequently and there has been no return of the trouble.

TONSILS

Hypertrophied

Case No. 357. Male. Age, 18. Tonsils chronically enlarged and crypts filled with caseous material. After cleaning out the caseous masses we began actinic-ray treatments, using our special applicator.

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Oct. 30	3 min.	Contact	Conscious of constant irritation.
Oct. 31	3 min.	Contact	
Nov. 2	3 min.	Contact	Throat feels clearer.
Nov. 9	3 min.	Contact	
Nov. 30	3 min.	Contact	Very much improved.
Dec. 3	4 min.	Contact	Improved.
Dec. 5	4 min.	Contact	
Dec. 12	4 min.	Contact	
Dec. 19	4 min.	Contact	Tonsils well within the pillars and healthy.

and himself to feed. We then somewhat reluctantly took the case, because we felt he needed all the help he could get, although, under such adverse circumstances, we scarcely expected him to recover. However, he steadily continued to improve and today is apparently well—clinically so. He still has his cavity, and will continue to carry it. What other treatment would have produced the same results under the same circumstances?

His treatments consisted of ten minutes under the radiant lamp, followed by ten to fifteen minutes daily of actinic rays from the air-cooled lamp, until he had definite improvement (six weeks in this case), then thrice and twice a week. In August, 1917, he was accepted by the Draft Board.

The Michigan Boulevard Building X-ray Laboratory gave the following report on October 7, 1918 (see Plate XVI, opposite):

Case No. 35026. Mr. W.

Fibrocaseous tuberculosis of both upper lobes. The fresher infiltrates appear to be on the left side. Both apices clouded; no cavities apparent. Stereo plates would probably furnish additional details.

Diagnosis: Pulmonary tuberculosis.

Pulmonary

Case No. 0103. Female. Age, 28. In August, 1916, she began running a temperature and was constantly tired. Was in the Mercy Hospital, Chicago, for two weeks, where her case was pronounced pulmonary tuberculosis. At this time her temperature ran as high as 105° and she had pain in lower right thorax. September 1, 1916, she was sent to Denver, where she stayed for seven months, and then she went to Cheyenne, Wyo., for four months. During this time she had two hemorrhages. She came to us July 13, 1917, unable to work.

Treatments were given with radiant light for ten minutes, followed by the actinic rays for four minutes, gradually increasing to thirteen. Her cough decreased after the first week, when she

Case No. 114—Pulmonary Tuberculosis

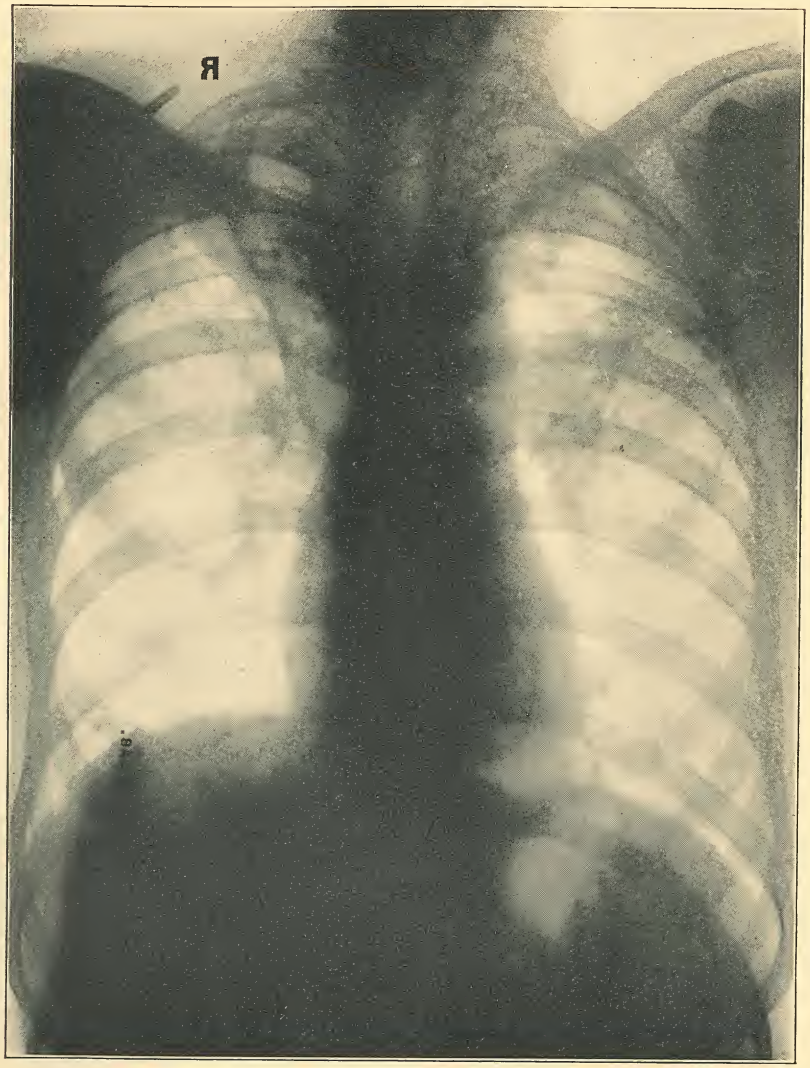
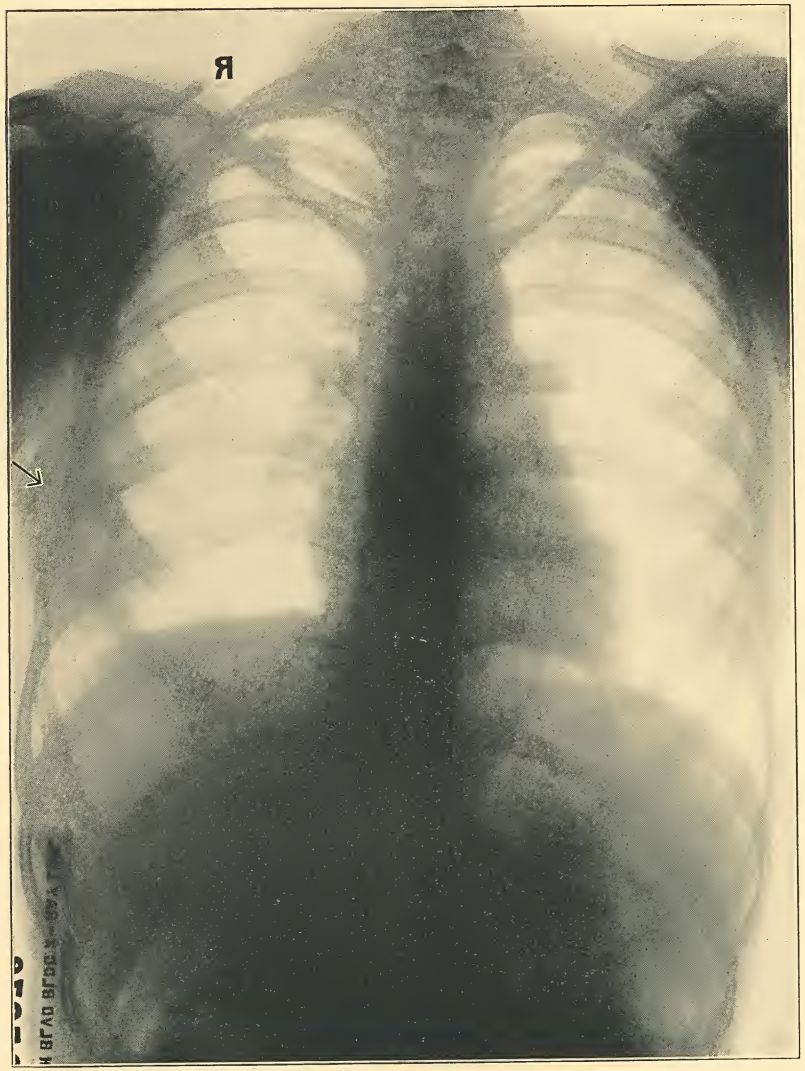


Plate XIX

Case No. 332B—Pulmonary Tuberculosis



Arrow indicates area drained.

Plate XX

started to work. In three weeks she was working as though nothing had happened. Her lung condition was improving rapidly, she coughed very little, and her general physical condition was very much improved. September, 1918, a letter from her stated that she was feeling fine and was employed as a school nurse.

Diagnosis: Pulmonary tuberculosis.

Pulmonary

Case No. 332B. Female. Age, 17. Contracted pneumonia in November, 1916, followed by an empyema in December, 1916, which was operated at the German-American Hospital, Chicago, during this month. We first saw her on September 28, 1917, at which time there was consolidation of the upper and middle lobes of the right lung. She coughed almost incessantly.

Her first treatment consisted of radiant light for ten minutes under the 2000-candlepower lamp and actinic rays for one minutes under the air-cooled lamp. These treatments were given daily for one month. The radiant light was used for ten minutes and the air-cooled lamp was started at one minute and increased one minute daily until a period of fifteen minutes was reached.

A blood count November 5, 1917, showed:

Erythrocytes	4,200,000
Leucocytes	26,400
Polymorphoneuclears	90%
Small lymphocytes	8%

She has improved steadily. During the second and third months, the treatments were given three times a week, the length of treatments at this time being ten minutes each with the radiant light and the actinic rays. There was no cough after the first month.

Actinic-ray treatments:

DATE 1918	RADIANT LIGHT Duration of Treatment	ACTINIC RAYS Air-cooled Lamp Duration of Treatment	ACTINIC RAYS Air-cooled Lamp Distance from Patient	CLINICAL FINDINGS
April 3	10 min.	1 min.	18 in.	
April 4	10 min.	2 min.	16 in.	T., 101.4; P., 120; R., 30.
April 5	10 min.	3 min.	14 in.	T., 101.8; P., 110; R., 25.
April 6	10 min.	1 min.	10 in.	Burned.
April 8	10 min.	2 min.	10 in.	T., 102.2; P., 88; R., 20.
April 9	12 min.	3 min.	10 in.	
April 10	12 min.	4 min.	10 in.	T., 101.1; P., 85; R., 22.
April 11	12 min.	5 min.	10 in.	
April 12	12 min.	6 min.	10 in.	
April 13	10 min.	7 min.	10 in.	
April 15	10 min.	8 min.	10 in.	
April 18	10 min.	9 min.	10 in.	T., 102.2; P., 130; R., 30.
April 23	10 min.	10 min.	10 in.	T., 99.6; P., 100; R., 24.
April 29	10 min.	10 min.	10 in.	T., 102; P., 90; R., 28.
May 1	10 min.	10 min.	10 in.	T., 101.4; P., 92; R., 24.
May 9	10 min.	10 min.	10 in.	T., 101.4; P., 108; R., 24.
May 13	10 min.	15 min.	10 in.	T., 101.4; P., 108; R., 22.
May 20	10 min.	15 min.	10 in.	T., 98.6; P., 88; R., 20.
May 30	15 min.	15 min.	10 in.	T., 98.6; P., 80; R., 20.
June 3	10 min.	15 min.	10 in.	T., 99; P., 86; R., 20. Went to work on half time.
June 7	10 min.	15 min.	10 in.	T., 101.2; P., 104; R., 20.
June 18	10 min.	15 min.	10 in.	T., 99.2; P., 92; R., 20. Working full time.
July 3	10 min.	15 min.	10 in.	T., 99.2; P., 104; R., 22. Weighs 128½ pounds.
July 18	10 min.	15 min.	10 in.	T., 102.2; P., 88; R., 20.
July 31	10 min.	10 min.	10 in.	T., 98.5; P., 88; R., 20. Weighs 130. Feeling fine.
Aug. 8	10 min.	10 min.	10 in.	Working every day.
Aug. 13	10 min.	10 min.	10 in.	
Aug. 22	10 min.	10 min.	10 in.	
Aug. 31	10 min.	10 min.	10 in.	T., 102; P., 100; R., 28.
Sept. 3	10 min.	10 min.	10 in.	Influenza.
Sept. 7	15 min.	15 min.	10 in.	T., 102; P., 100; R., 22.
Sept. 9	15 min.	15 min.	10 in.	Severe pain in lower left pleura. Stopped work.
Sept. 10	45 min.	10 min.	10 in.	Lower left chest bulging from effusion in pleural cavity.
Sept. 11	45 min.	10 min.	10 in.	Less pain.
Sept. 12	40 min.	10 min.	10 in.	Less pain.
Sept. 13	40 min.	10 min.	10 in.	Much improved.
Sept. 14	40 min.	10 min.	10 in.	No pain.
Sept. 16	15 min.	10 min.	10 in.	Weighs 122. Returned to work.

(*Continued on next page*)

Case No. 429—Pulmonary Tuberculosis

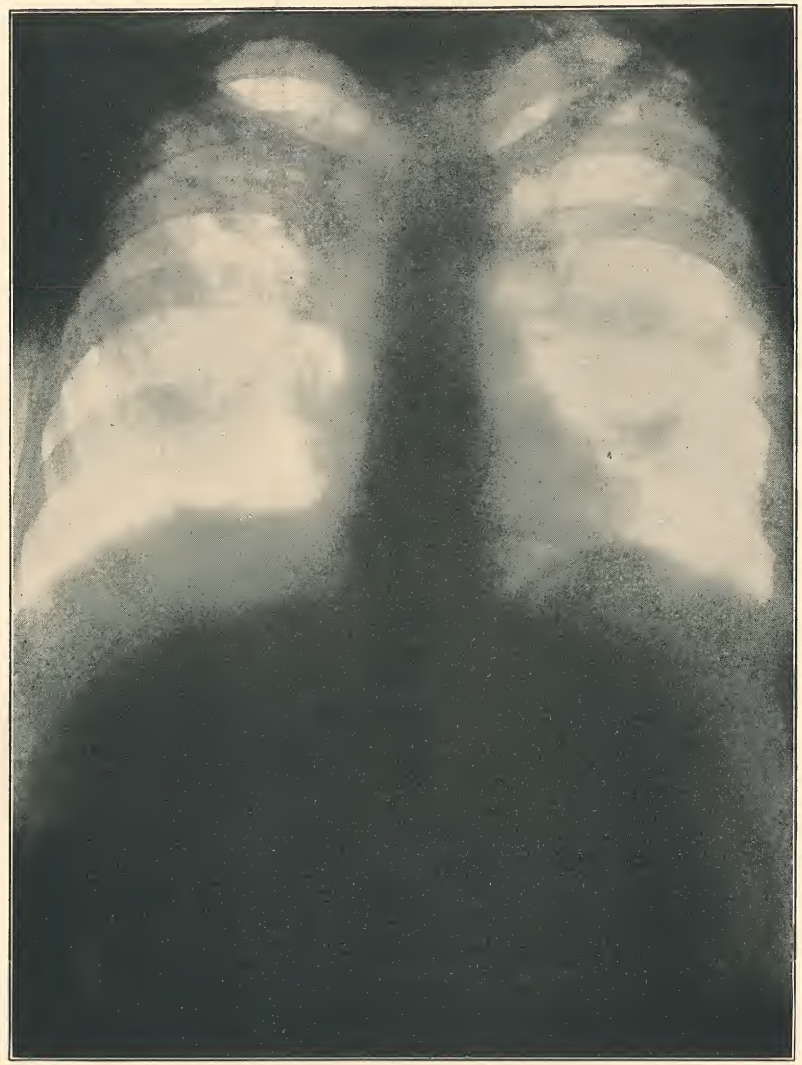


Plate XXI

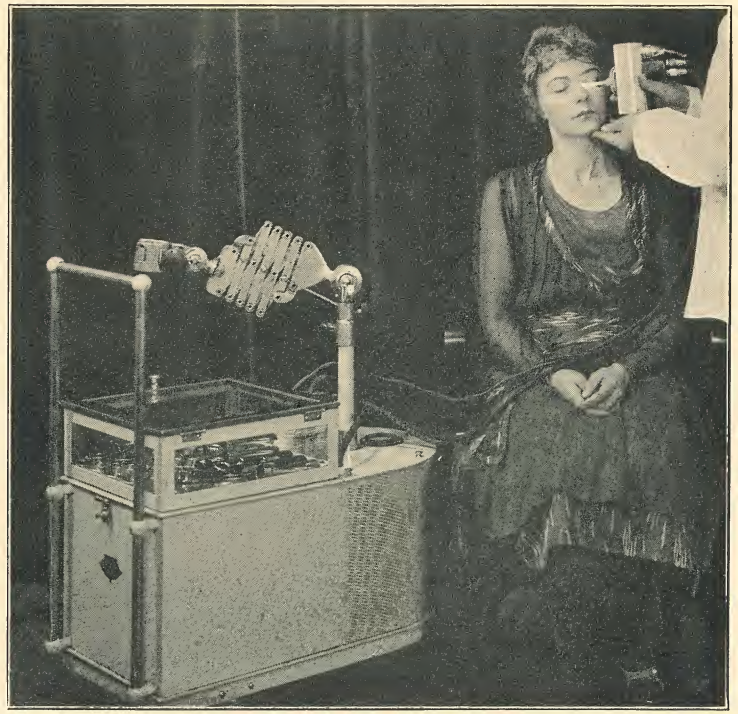
DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Oct. 30	2 min.	Contact	Nasal passages nearly closed.
Nov. 2	2 min.	Contact	Could breathe more freely twenty minutes after first treatment.
Nov. 6	2 min.	Contact	
Nov. 9	2 min.	Contact	
Nov. 20	2 min.	Contact	
Nov. 23	3 min.	Contact	Can breathe freely through nose.
Nov. 30	3 min.	Contact	
Dec. 3	4 min.	Contact	
Dec. 5	4 min.	Contact	
Dec. 12	4 min.	Contact	
Dec. 19	4 min.	Contact	Plenty of breathing space. Dismissed.

VESICULITIS

Case No. 249. Age, 26. Neisserian infection four years ago. Now suffering from vesiculitis; no strictures.

Actinic-ray treatments, through our special proctoscope, as given below:

DATE	ACTINIC RAYS	PROSTATE MASSAGE	CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	
Nov. 10	8 min.	4 min.	
Nov. 20	10 min.	4 min.	
Nov. 28	10 min.	4 min.	Sleeping improved.
Dec. 3	10 min.	4 min.	
Dec. 8	10 min.	4 min.	
Dec. 15	10 min.	4 min.	
Dec. 21	10 min.	4 min.	
1918			
Jan. 1	10 min.	4 min.	No discharge.
Jan. 14	10 min.	4 min.	Feeling much better.



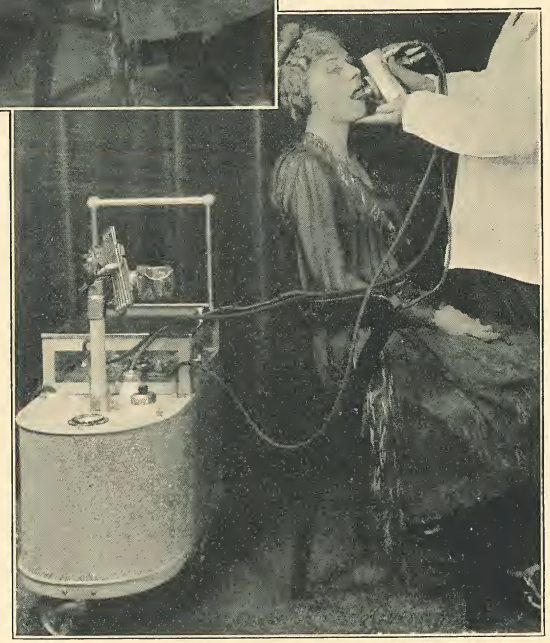
Local application for small areas.

Nasal treatment.

Aural treatment.

Plate XXII

Treatment for pyorrhea—outer surface of gum.



Treatment for pyorrhea—inner surface of gum.

Plate XXII–A

CHAPTER V

Additional Data

MANY new facts have been added to our previous knowledge of actinic rays. That they are of extreme value in constitutional disorders has been verified by those who use these rays. That nothing except drainage even equals them in sepsis has been proved beyond doubt. That they will not destroy malignancies unaided is a known fact, but that they are of extreme value for the anemia secondary to a malignancy also is without question.

One advanced case of anemia with a 15 per cent hemoglobin reached 25 per cent in ten days, or one per cent a day when treated with the rays; the erythrocytes climbing from 1,400,000 to 2,500,000 in the same time, or 110,000 daily, while the leucocytes increased from 4000 to 6400, or 240 daily, proving what we have contended for years—that the erythrocytes are increased while the leucocytes are normalized. In thirty days this same case recorded hemoglobin 40 per cent, erythrocytes 3,900,000, leucocytes 7900, and this despite the fact that the malignant tumor continued to grow.

To treat a malignant tumor and neglect the possessor of it is the height of folly, for cancers are blood conditions with local manifestations, the removal of which adds but little to the comfort or longevity of the patient unless something is done to correct the hemogenesis. Ross many years ago obtained definite benefit with potash salts. The profession did not take kindly to the suggestion, so it was "sown on stony ground"; but for several years we have been making extensive experiments along these lines with some remarkable results.

Fallopian-tube infections are readily relieved with the water-cooled lamp when it is used in conjunction with general radiant light and actinic ray treatments. One patient who had been in

"Many of the constituents of living cells absorb ultra-violet light to a considerable degree.

"The reaction of certain small animal organisms to ultra-violet light obeys definite laws. A minimum duration is necessary; there is a limit of intensity below which no reaction occurs, and the effect is independent of temperature. These facts point to the occurrence of a photo-chemical reaction, whose products excite skin receptors.

"The direct action of ultra-violet light on micro-organisms and on tissue cells is a lethal or destructive one. The shorter the wave length, the more powerful the effect with equal energy of the radiation, probably owing to the greater absorption of the short waves by protoplasm.

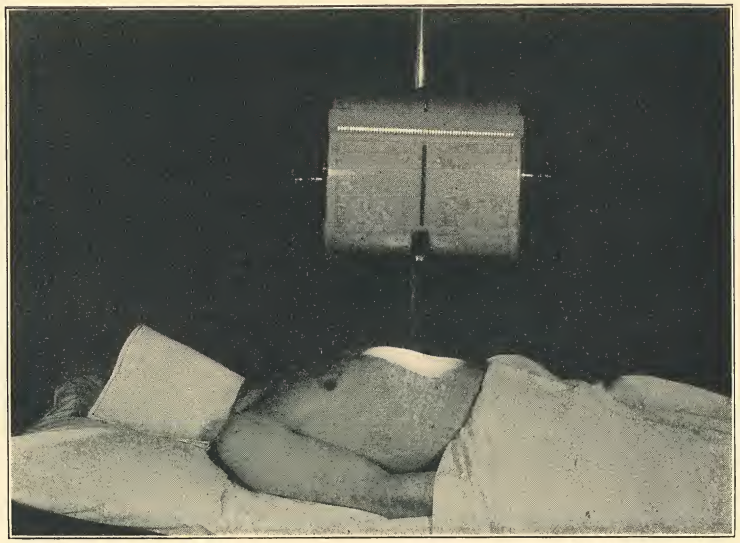
"Similar action can be produced by visible light in the presence of a dye which can absorb this light (photo-dynamic sensitisation).

"Application of the facts of photo-chemical reactions to the retinal process is suggested in the text.

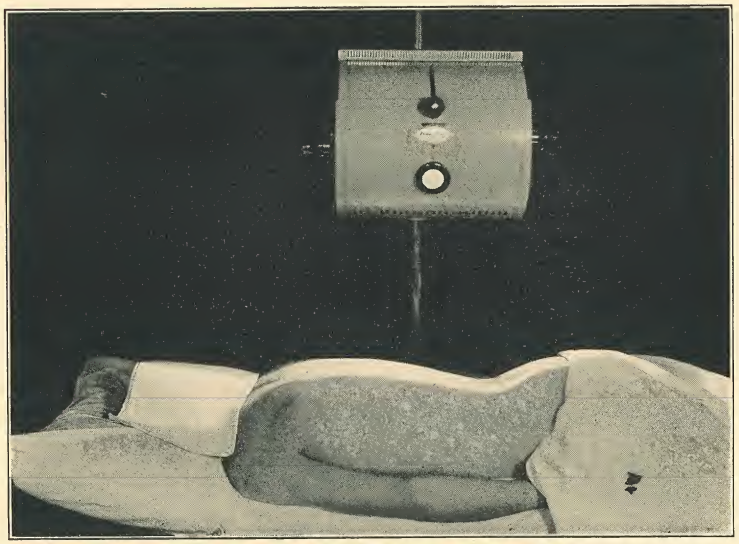
"Light causes changes of permeability in the cell membranes and, in plants, has been shown to have the effect of retarding growth.

"Certain animals adapt the color and pattern of their skin markings to suit the background against which they are seen. In the frog, the receptors for the reflex are situated in the toes and the eyes play no part. In the fish, the eyes are the receptors."

That actinic rays will cure X-ray burns is without question. That they will cure every case without question as to its age or severity is open to question, but that they will benefit every case is without doubt in the writer's mind, for we have taken burns which were eight years of age and obtained great benefit in a single treatment with a water-cooled mercury-quartz lamp. Recently we had a case of eight weeks' standing which was gradually growing worse, the area involved being about ten by fifteen *cm.* One-half the area healed in twenty-four hours after a one-minute treatment with a modern air-cooled mercury-quartz lamp, and the remaining portion closed in forty-eight hours after a second treatment of two minutes.



Showing treatment for gastric or duodenal ulcers.



Showing method of treating spine.

Plate XXIII

Plate XXIII–A

We have made the statement repeatedly for years that a case which had received a full dose or course of doses of X-ray could be given a half dozen daily treatments of actinic rays and the X-ray treatments repeated and increased without danger of surface burns. Of this we are now certain: actinic ray treatments following X-ray treatments render the latter inocuous. The actinic-ray treatment should be long enough to produce a distinct hyperemia and blistering will do more good than harm, although it is unnecessary. About one minute at forty *cm*, with an air-cooled, modern, mercury-quartz lamp will do for the first treatment, increasing one minute daily up to ten minutes. With a modern water-cooled lamp one-fourth minute at five *cm* would be about right.

On page 43 we give our reasons for preceding each actinic-ray treatment with a radiant-light treatment. These reasons are well amplified by the experience of ourselves and others and we feel more than ever that a photo-therapy treatment is not giving the best results if carried out in any other way.

New photo-therapy apparatus is now on the market which bids fair to outstrip its predecessors in practical efficiency and even this is but the first step forward, for it is hoped that in the near future light can be so arranged that after the preliminary dilatation of the superficial vessels it may be possible to continue the radiant light while giving the actinic-ray treatment without decreasing its activity, the practical application of which will mean a wonderful advance in photo-therapy.

In 1918, while visiting in an Indiana city, we were asked to see a case of gastric ulcer which had been pronounced incurable. The patient had been vomiting for three months, and was badly emaciated and taking morphine constantly for his pain. We advised actinic rays and gave the first treatment of five minutes' duration and had the satisfaction of seeing him twenty-four hours later with very little pain and of hearing three months later that he had gained thirty-seven pounds and was back at work and the still greater satisfaction of recently hearing that he still remains well. Do you wonder that our

CHAPTER VIII

TABLE OF DISEASES

GLOSSARY

"A. C. L." means "air-cooled lamp."
"W. C. L." means "water-cooled lamp."
"Time" is given in minutes.
"Distance" gives the number of inches the lamps should be from the patient.

Frequency: "D" means "daily."
"W" means "weekly."
"2/W" means "twice weekly."
"3/W" means "thrice weekly."

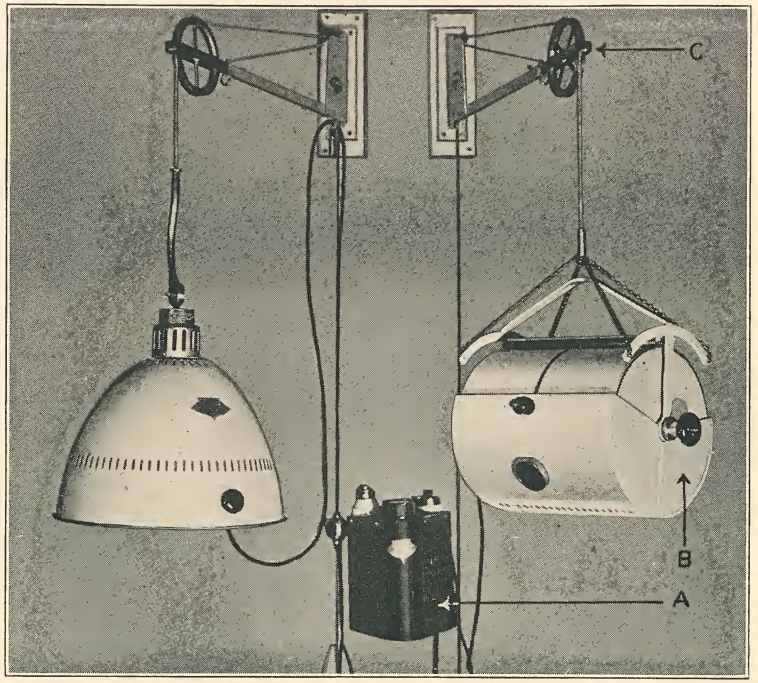
"Radiant light" means a 1500-watt lamp.

The distance of the lamp from the patient is not given, as it varies with each patient and should be just far enough away to be comfortable. If too close it produces a nervous irritability. Where radiant light is used it should precede the actinic-ray treatment.

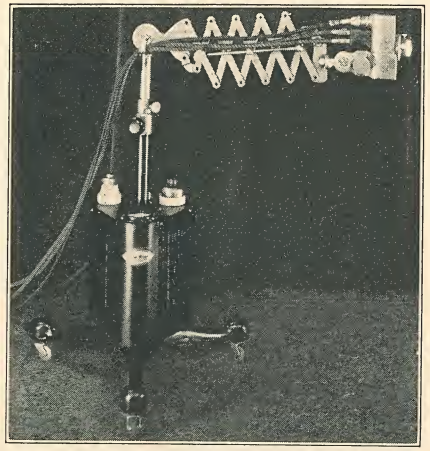
"Remarks" are self-explanatory.
"L" means "local."
"G" means "general" or body treatment.
"C" means "contact."
"Spec." means "speculum."

When both actinic-ray lamps are quoted for one disease, either may be used or the water-cooled lamp for local treatment and the air-cooled lamp for general treatment of the same case.

In the following table the author has endeavored to give the maximum and minimum of time and distance for each lamp and for each separate disease. This table is intended for a guide; experience alone will teach you the exact amount needed.

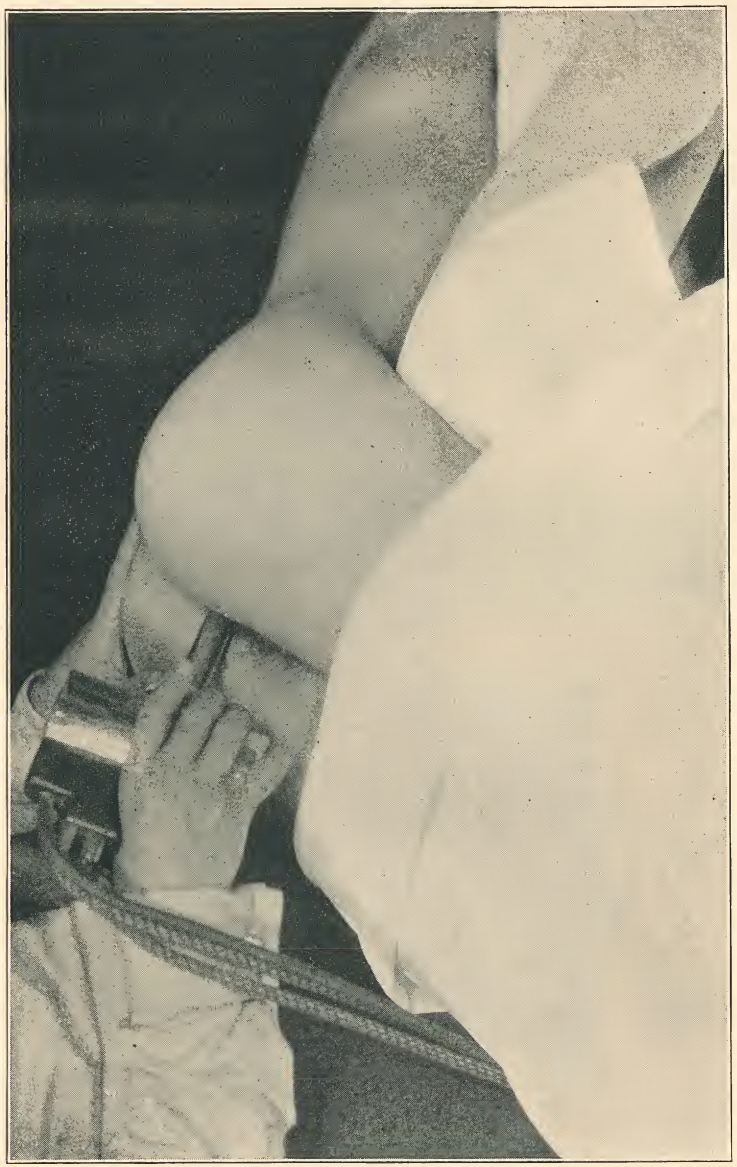


Showing best method of hanging radiant and air-cooled lamps.



Water-cooled lamp used for compression treatments.

Plate XXIV



Showing method of treating sigmoid and rectum.

Plate XXV

GENERAL TREATMENTS

Start the treatments with radiant light, using a 1500-watt bulb over torso for from ten to twenty minutes both front and back. Then use the air-cooled mercury-quartz lamp for one-half minute, increasing one-half minute daily until treatments of eight or ten minutes are being given. The air-cooled lamp should be about thirty inches from the patient for the first treatment. Decrease this distance about two inches daily for five days, then keep the lamp at about eighteen inches from the patient for all following treatments.

For patients sensitive to actinic rays it may be necessary to keep the lamp at a distance of at least twenty-four inches. Remember always that blondes blister more easily than brunettes.

My former advice to take the first treatment given with the lamp still holds good. Try it and find out why.

Actinic rays are auxiliary to all other recognized methods of treatment, although in many cases they alone are sufficient.

The following table is to be used with the Burdick lamps